under 35 U.S.C. §103(a) as being unpatentable over Kafka in view of "Ti:sapphire regenerative amplifier for ultrashort high-power multikilohertz pulses without an external stretcher" by Joo et al. (hereinafter "the Joo article"). The Office Action, in paragraph 22, rejects claim 11 under 35 U.S.C. §103(a) as being unpatentable over Kafka in view of U.S. Patent No. 5,815,519 to Aoshima et al. (hereinafter "Aoshima"). These rejections are respectfully traversed.

At the outset, it should be noted that this application was filed on May 8, 2006. This is the fourth substantive rejection of the pending claims over prior art. Previous rejections rejected the pending claims over a reference referred to as "the Norris article;" U.S. Patent No. 5,353,291 to Sprangle et al. in view of a reference referred to as "the Hentschel article;" U.S. Patent Application Publication No. 2002/0149836 A1 to Jovanovic et al. in view of the Hentschel article; and the Norris article in view of the Hentschel article, alone or in combination with Perry.

In reply to the previous rejection, the claims were not amended. It is difficult for Applicants to understand how this Office Action now asserts a rejection under 35 U.S.C. §102(b) over any reference. Applicants believe that it is further unreasonable for the Office Action to assert a rejection over Kafka for the reasons set forth below. Applicants are concerned that this application has been the subject of prolonged and piecemeal examination by the Patent Office. Under the provisions of MPEP §707.02, Applicants respectfully request that any further Office Actions that may issue regarding this application be specifically reviewed by a Supervisory Patent Examiner in an effort to finally conclude prosecution of this application.

Claim 1 recites a laser system according to the principle of the regenerative amplifier, comprising an amplifying laser medium, a laser resonator having at least one resonator mirror and at least one modulator, and a pump source for pumping the laser medium, wherein the

laser resonator is designed to operate with a repetition rate of greater than 50kHz and has a pulse stretcher, inside a cavity of the resonator, as a specially designed component, the pulse stretcher having at least one of a structure- or material-related dispersive effect, the pulse stretcher having a minimum 3rd order dispersion with a maximum 2nd order dispersion.

Kafka cannot reasonably be considered to teach, or otherwise to have suggested, this specific combination of features. Kafka teaches a dispersion compensation for ultrashort pulse generation in lasers. Applicants respectfully submit that Kafka is not even related to the technology claimed in the pending application, and for the reasons discussed below, fails to disclose at least two of the features positively recited in independent claim 1. As is discussed below, and for the totality of the reasoning set forth in the attached Declaration of Dr. Paschotta, Kafka is directed to a completely different operating principle and architecture, and Kafka, like the other previously-applied references, lacks disclosure of a specifically designed pulse stretcher, the structure of which is positively recited in independent claim 1.

The operating principle and architecture of Kafka's system differ from what one of ordinary skill in the art would understand to include a regenerative amplifier. *See, e.g.*, paragraphs 9-12 of Dr. Paschotta's letter.

Those of ordinary skill in the art generally understand regenerative amplifiers to be devices that are used for strong amplification of optical pulses, usually with ultrashort pulse durations in the picosecond or femtosecond range. Multiple passes through a gain medium (nearly always a solid-state medium) are achieved by placing the gain medium in an optical resonator, together with an optical switch, usually realized with an electro-optical modulator and a polarizer. As the number of passes in the resonator is controlled with the optical switch, it can be very large, so that a very high overall amplification factor (or gain) may be achieved. As is clear from the disclosure of the pending application, at least in Figs. 1 and 2, and in the accompanying description, the above general understanding of those of ordinary

skill in the art is represented. Fig. 1 shows a diagram of a cavity of a laser system according to the principle of a restorable amplifier according to the prior art. Fig. 2 shows a diagram of a cavity of a first embodiment of a laser system according to this disclosure. At, for example, page 16, line 31 and below, Applicants' disclosure describes Fig. 1 in great detail. At, for example, page 17, line 9 and below, the arrangement of an example of a restorable or regenerative amplifier is described as including, for example, "[b]y appropriate switching, it is thus possible both to input pulses into the arrangement and to output them as laser pulse S. The electro-optical modulator 3, together with the polarizer 1, thus forms an externally controllable switch by means of which a laser pulse can be alternatively input and output and the resonator quality can be controlled."

Kafka does not show any optical switch that constitutes any element of any alleged regenerative amplifier. In other words, failing to show such an optical switch, Kafka fails to show what one of ordinary skill in the art would understand to be in the field of regenerative amplifier. It should be noted that Kafka does not use the term "regenerative amplifier," or any other term that would be understood by those of skill in the art as disclosing such a design.

Kafka also fails to disclose a specially designed pulse stretcher as claimed in claim 1. Careful review of Kafka shows that it does not use any term like "pulse stretcher" or "stretching." Therefore, the document is silent regarding this required aspect of the pending claims. *See, e.g.*, paragraph 12 of Dr. Paschotta's letter.

The Office Action alleges that the sequence of prisms shown, for example, in Fig. 4a, can be considered as defining a pulse stretcher. Unfortunately, Kafka does not describe the series of prisms in any manner that one of ordinary skill in the art would consider to constitute a pulse stretcher, as is asserted by the Office Action. Kafka describes these prisms in detail at least at col. 6 of the disclosure. At, for example, line 12 and below, Kafka states "[i]n general, ring cavities are more complicated than linear cavities, and linear cavities are

generally chosen. This is true for Ti:Sapphire, however, the typical rod thickness of 2 cm causes greater intercavity dispersion and has more stringent mode matching requirements than in previous ultrafast laser systems." The disclosure of Kafka goes on then to assert explicitly that "[t]o compensate for the dispersion caused by this extra material, more dispersive prisms, such as SF-10 glass brewster prisms, can be used, but the distance between the prisms must still be increased, to as much as 50 cm." Kafka asserts that "[t]his is because the dispersion generated by the prism pair increases linearly as the distance between the prisms increases."

In col. 6, lines 36 and below, Kafka describes a preferred embodiment of the present invention as allowing "the large prism spacings required for Ti:Sapphire laser." Kafka goes on to describe certain other features by referring to Fig. 4a as including "a laser 10 in a folded cavity [that] looks much like the lasers of Figs. 3a-3c, except that a group of four prisms 64, 66, 68 and 70 are positioned in the arm of the cavity containing mode locker 24 and a curved end mirror 20. Kafka describes the use of these prisms by stating that "[c]urved mirror 20 can be the output coupler since the spectral spread of the laser beam generated in the first two prisms 64 and 66 is canceled in the second two prisms 68 and 70."

One of ordinary skill in the art would not equate the dispersion compensation of Kafka with pulse stretching. *See, e.g.*, paragraph 13 of Dr. Paschotta's letter. Those of ordinary skill in the art recognize dispersion compensation as essentially meaning canceling the chromatic dispersion of some optical elements. The term, even in a more general sense of dispersion management, means to control the overall chromatic dispersion of some system. Given this understanding, one of ordinary skill in the art would not understand dispersion compensation as pulse stretching. Rather, those of skill in the art would understand dispersion compensation as mainly meaning avoiding temporal broadening, which those with skill in the art understand is another expression for "stretching."

The above understanding of those of skill in the art is what is taught by Kafka in that at, for example, col. 7, line 20 and below, regarding the intracavity Gires Tournois interferometer (GTI), Kafka teaches "[i]t has been further discovered that including a sequence of prisms and a GTI in the same cavity can be advantageous, if a GTI with a spacing of 80 microns is used by itself, pulses of 1-2 picoseconds are produced. If this GTI is combined with prisms the same pulses are observed. In this regime the GTI dominates. *Thus, a laser can be easily converted from a picosecond laser (using prisms) to a femtosecond laser just by adding the GTI to the laser cavity of Fig. 4a*" (emphasis added). Kafka also teaches that "[w]hile the prisms compensate the intracavity dispersion (linear group velocity dispersion) they introduce some errors at the same time. These are in the form of higher order terms in the group velocity dispersion equation. *These errors can limit the shortest pulsewidth obtainable and can be corrected by using a GTI*, with a spacing of about four to ten microns and a reflectivity of 4% and 25%."

Given the above teachings of Kafka, one of ordinary skill in the art would understand that Kafka deals with shortening pulses, but not with pulse stretching. In fact, it would be specifically contrary to the teachings of Kafka, which discusses the use of GTIs for compressing pulses, to understand that the prism sequence of Kafka in any way intentionally stretches pulses.

In summary, as particularly noted in Dr. Paschotta's letter, the teachings of the Kafka reference are entirely misapplied to the subject matter of the pending claims. Kafka does not teach a like structure, despite the assertions to the contrary in the Office Action.

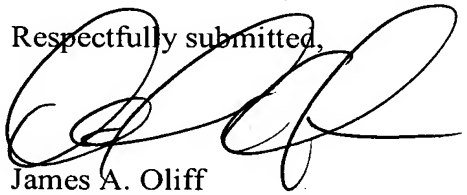
For at least the foregoing reasons, and upon consideration of the attached letter from Dr. Paschotta, Kafka cannot reasonably be considered to teach, or otherwise to have rendered obvious, the combination of all of the features positively recited in independent claim 1. Further, claims 2-12 and 14-17 also would not have been taught, or otherwise rendered

obvious, by any of the asserted combinations of applied references for at least the respective dependence of these claims directly or indirectly on an allowable base claim, as well as for the separately patentable subject matter that each of these claims recites.

In view of the foregoing, Applicants respectfully submit that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-12 and 14-17, in addition to the allowance of claim 13, are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number set forth below.

Respectfully submitted,



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Attachments:
- October 8, 2010 Letter from Dr. Paschotta
- Petition for Extension of Time

Date: October 27, 2010

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